

PERMIT NO. 1000164

TECHNICAL REVIEW REMARKS
TO ACCOMPANY ALL ENGINEERING REVIEWS

REMARK NUMBER	REMARKS
1.	This is a renewal of an existing permit. There is no fee for permit renewal.
2.	EPNG indicated in the cover letter submitting the Title V permit application that they forwarded a copy of the application to EPA Region IX.
3.	This facility has a potential to emit (PTE) of more than 100 tons per year of NO _x and CO.
4.	Department records and discussions with AQD Compliance staff indicate that the source is in compliance with these requirements.
5.	The facility is located in Coconino county.
6.	EPNG submitted emissions estimates for significant emission sources only. Emissions were not quantified for emission sources deemed insignificant.
7.	See attached remarks and emission calculations.
8.	<p>EPNG's Title V permit application and ADEQ records indicate that EPNG have complied with the requirements of Installation Permit M05873. This installation permit authorized the installation of a GE Frame 5 gas turbine engine, and included the following requirements: 1) The installation will be performed in accordance with the requirements of A.A.C. R18-2-801.1 and 801.36 (40 CFR 60 Subparts A and GG); 2) Only natural gas having a sulfur content no greater than 0.8 % by weight would be combusted in the gas turbine engine; and 3) The GE frame 5 gas turbine engine would be performance tested for NO_x and CO no later than 180 days after initial startup (note that there is no applicable standard for CO emissions for this engine, but there is an applicable SO₂ standard.) Test method 20 was specified for NO_x, and method 10 for CO.</p> <p>Installation permit 85001 required the Solar Saturn T-1021 gas turbine engine to comply with the requirements of A.A.C. R9-3-831 (40 CFR 60 Subpart GG). There has been some discussion on applicability of NSPS to this turbine. However, the source in its letter to the Department dated September 28, 1995, agreed that the turbine is in fact subject to NSPS. Per the installation permit no. 85001 and the source's letters dated September 28, 1995, and December 8, 1995(requesting NSPS coverage for the Solar turbine), the Solar turbine is subject to NSPS.</p>
9.	There are no emission controls installed at the Williams station.

REMARK NUMBER	REMARKS
10.	There are no applicable standards for these pollutants for this facility.
11.	EPNG may perform asbestos demolition at this facility at some point during the permit term. This demolition would be subject to the requirements of A.A.C. R18-2-1101.A (40 CFR 61 Subpart M.)
12.	<p>The initial performance test for the GE Frame 5 gas turbine engine was conducted on 4/6/94. Tests were conducted for NO_x and CO. Petrochem Environmental Services conducted the test, and page 4 of the test report lists a four-run NO_x concentration of 199 ppm, at 15% oxygen, ISO conditions, which meets the applicable NO_x standard of 40 CFR 60.332(a)(2). EPNG included the results of those tests in the Title V permit application, at Tab 3. A more recent performance test on the Frame 5 was conducted on 10/17/96, and results indicated compliance with Subpart GG.</p> <p>According to EPNG's Title V permit application (Tab 3, Table 1), the Solar Saturn engine/generator set that is currently installed at the Williams compressor station (S/N 20169) was tested on April 5, 1993, although I could find no records of this test in ADEQ files.</p>
13.	EPNG has certified that the Williams station is currently in compliance with all applicable air quality requirements.

PERMIT NO. 1000164

GENERAL COMMENTS AND EMISSIONS CALCULATIONS

Prior Permits

El Paso Natural Gas Company (EPNG) is applying for a Title V permit for the Williams Compressor Station.

The facility is subject or has been subject to the following prior air quality permits:

Installation Permits

1. Installation Permit no. 85001, for installation of a Solar T-1021 gas turbine, replacing a PSVG-10 internal combustion (IC) engine. The permit required the source to operate the Solar T-1021 turbine in accordance with R9-3-831 (Superseded by R18-2-901.38).

The Ingersoll Rand PSVG-10 was originally planned for removal, when the Solar T-1021 was installed, as required by IP 85001. EPNG subsequently notified the Department that the PSVG-10 would be retained onsite and used for "emergency standby" use only (when the T-1021 is not operating, and purchase power is not available.) However, EPNG does in fact operate the PSVG-10 as a supplemental power source, not as a standby source. The Title V permit application shows that in 1993, EPNG operated the Solar T-1021 a total of 8589 hours, while the PSVG-10 operated a total of 4396 hours. The Title V operating permit will include both the Solar Saturn T-1021 engine and the PSVG-10.

2. IP M05873, for installation of a GE 5252B gas turbine engine, to replace the IC engines in the "A" plant was issued on April 3, 1993. The NO_x emissions from this GE Frame 5 unit are 876 tons per year (tpy). The actual reductions available from the IC engines were 1882.74 tpy. Thus the project reduced emissions of NO_x by 1006.7 tpy and hence was not subject to PSD review. The relevant conditions of this permit are:
 - A. The gas turbine is subject to 40 CFR 60, Subparts A and GG.
 - B. Opacity from the stack of the gas turbine shall not exceed 40 percent for any period greater than 10 consecutive seconds.
 - C. Total emissions shall not exceed the values given in Attachment "C". (This was based on the source's potential to emit i.e. based on 8760 hours of operation. This is no longer required in operating permits and hence is removed.)
 - D. Performance tests shall be conducted for NO_x and CO using Methods 20 and 10 respectively.
 - E. Sulfur content of fuel not to exceed 0.8 percent by weight.

- F. Results of the closest sulfur monitor and fuel bound nitrogen monitor which is representative of the fuel consumed at Williams to be maintained.

Applicable Regulations

- The GE M5322R gas turbine engine, S/N 282044, was manufactured in 1981, and installed at the Williams station in 1993, and is therefore subject to the requirements of A.A.C. R18-2-901.1 and 901.38 (40 CFR 60 Subpart A and Subpart GG).
- The Solar T-1021 gas turbine engine, S/N 20169, per the source's letter dated December 8, 1995, requesting NSPS coverage and installation permit 85001, is subject to the requirements of A.A.C. R18-2-901.1 and 901.38 (40 CFR 60 Subpart A and Subpart GG).
- The four (4) Clark TLA-6 IC reciprocating engines, the Clark TLA-10 IC reciprocating engine, and the Ingersoll Rand PSVG-10 IC reciprocating engine/generator set are all subject to the requirements of A.A.C. R18-2-719.
- Several standards from A.A.C. Title 18, Chapter 2, Article 6 apply to the facility, and EPNG is requesting that A.A.C. R18-2-726 and 727 be explicitly listed in the Title V permit as applicable requirements, since EPNG anticipate performing spray painting and sandblasting operations at the facility during the permit term.

Emissions Calculations

Emissions calculation checks were performed for all of the engines at Williams, but only those for the GE M5322R gas turbine engine are presented here. The other internal combustion engines (four (4) Clark TLA-6 IC reciprocating engines, the Clark TLA-10 IC reciprocating engine, and the Ingersoll Rand PSVG-10 IC reciprocating engine/generator set) are subject to A.A.C. R18-2-719, which has only a particulate matter emissions limit and an opacity standard. Because the internal combustion engines at the Williams compressor station burn only pipeline natural gas, the only pollutants that they emit in significant quantities are NO_x, CO and VOC's. However, none of these pollutants are subject to an applicable standard by A.A.C. R18-2-719. Furthermore, the potential emissions of the GE M5322R gas turbine engine alone make the Williams compressor station a major source. The combined emissions of formaldehyde from all of the internal combustion engines on the emissions sources form also make the Williams facility a major source (formaldehyde (HAP) emissions > 10 tpy).

1) Test Data

EPNG submitted test data (at full load) for the GE M5322R gas turbine engine. The test data were obtained during a test performed on 4/6/94. Note that A.A.C. R18-2-901.38 (40 CFR 60 Subpart GG) has a NO_x limit and SO₂ limits, but no limit for CO emissions. EPNG complies with the NSPS sulfur dioxide emissions limit by burning pipeline natural gas having a sulfur content less than 0.8 percent by weight in the GE M5322R gas turbine engine.

NO_x: (144 lb/hr)(8760 hr/year)/2000 lb/ton = 630.7 tpy
CO: (2.26 lb/hr)(8760 hr/year)/2000 lb/ton = 9.9 tpy
THC: (1.50 lb/hr)(8760 hr/year)/2000 lb/ton = 6.6 tpy

2) Emission Factors

Criteria pollutant and total hydrocarbon emissions are calculated below using AP-42 factors from the 1/95 (fifth) edition, Table 3.2-2. Formaldehyde emissions are calculated using data from Table 18 of EPA-450/4-91-012.

Emission factors were calculated assuming a maximum engine power rating of 31230 hp (see Table 11-1, page 7 of EPNG's Title V permit application.)

NO_x: (2.87 lb/10³hp-hr)(31230 hp)(4.38) = 393 tpy

CO: (1.83 lb/10³hp-hr)(31230 hp)(4.38) = 250 tpy

THC: (0.2 lb/10³hp-hr)(31230 hp)(4.38) = 27 tpy

VOC: (0.02 lb/10³hp-hr)(31230 hp)(4.38) = 2.7 tpy

SO₂: AP-42 emissions are negligible for SO₂ = 0 tpy

formaldehyde: (0.04 g/hp-hr)(1 lb/453.6 g)(31230 hp)(4.38) = 12 tpy

3) Emissions Summary

The table below compares the emissions estimates for the GE M5322R gas turbine engine at the Williams station calculated from test data to emissions calculated using AP-42 emission factors.

* Potential Emissions Summary - EPNG Williams Station - GE M5322R Gas Turbine		
Pollutant	Test Data, 4/6/94 (PTE, tpy)	AP-42 (Fifth Edition) Table 3.2-2 (PTE, tpy)
NO _x	631	393
CO	9.9	250
SO ₂	not available	0
VOC	0.66	2.7
formaldehyde	not available	12

* PTE's assume 8760 hrs/yr operation.

Discussion

The results above show that the Williams station is a major source (based on PTE's submitted by EPNG.) When emissions from all of the engines on the emissions sources form are included, the facility is a major source of HAPs (formaldehyde).

Test data from the initial performance tests of the GE M5322R gas turbine at the Williams station indicate that this unit can meet the NSPS NO_x limit. The applicable NO_x limit for this unit is 40 CFR 60.332(a)(2):

$$\text{STD} = 0.0150 \times (14.4)/Y + F$$

where:

STD = allowable NO_x emissions (percent by volume at 15 percent oxygen and on a dry basis).

Y = manufacturer's rated heat rate at manufacturer's rated peak load (kilojoules per watt hour), or actual measured heat rate based on lower heating value of fuel as measured at actual peak load for the facility. The value of Y shall not exceed 14.4 kilojoules per watt hour.

F = NO_x emission allowance for fuel-bound nitrogen as defined in 40 CFR 60.332(a)(3).

The value of "Y" for the GE M5322R engine can be calculated from data supplied by EPNG in the Title V permit application for the Williams compressor station, page 7, where the maximum heat input is listed as 201 MMBtu/hr, at a peak load of 31230 hp. Using these numbers, the NSPS NO_x limit can be calculated as follows (assume no fuel-bound nitrogen, per EPA Guideline document EMTIC GD009, dated March 12, 1990):

$$(201 \text{ MMBtu/hr}) / (31230 \text{ hp}) = 6436.1 \text{ Btu/hp-hr}$$

$$(6436.1 \text{ Btu/hp-hr})(1 \text{ hp}/745.7 \text{ W})(1054.2 \text{ J}/1 \text{ Btu})(1 \text{ KJ}/1000 \text{ J}) = 9.1 \text{ KJ/W-hr}$$

$$\text{STD} = (14.4/9.1)(0.015) = 0.0237 = 237 \text{ ppmvd at } 15\% \text{ O}_2$$

The test data obtained on 4/6/94 show NO_x emissions for engine S/N 282044 of 199 ppmvd at 15% O₂ ISO (average of three test runs). Based on these test results, it is reasonable to assume that the GE M5322R gas turbine engine at the Williams compressor station will continue to meet the NSPS NO_x emission limit.

EPNG can be expected to comply with the NSPS fuel sulfur content limit of 40 CFR 60.333(b), by burning only pipeline natural gas in the GE M5322R gas turbine. The sulfur content of this fuel is limited by a FERC tariff agreement to levels well below the NSPS standard of 0.8% sulfur by weight.

Permit Contents: Attachment B

The four Clark TLA-6 reciprocating engines were installed in November, 1956. The Clark TLA-10 reciprocating engine was installed in May, 1960. The Ingersoll Rand reciprocating engine was installed in 1953. These are as such are not subject to the provisions of any of the new source performance standards (NSPS) (A NSPS for gas turbines was promulgated on 9/10/1979 and is listed as Subpart GG of 40CFR60. This contains NO_x and sulfur dioxide standards). The state rule that covers gas turbine operations is *R18-2-719 : Standards of performance for existing stationary rotating machinery*. This state rule considers emissions of three pollutants (i) particulate matter, (ii) visible emissions, and (iii) sulfur dioxide. There is no reference to NO_x or CO emissions. The General

Electric Frame 5 turbine engine was installed in October, 1993 and is subject to requirements of NSPS. The Solar turbine installed in 1988 is also subject to NSPS requirements.

Emission Limits/Standards

A. Clark Reciprocating Engines and Ingersoll Rand Reciprocating Engine

Natural gas combustion results in negligible particulate matter emissions. The maximum potential particulate emissions from the engines at the Williams station were calculated to be 16.9 tpy. The emissions standard in R18-2-719.C imposes a particulate matter emissions limit of 315 tpy.

The operating permit requires EPNG to combust only natural gas for turbine operations. The sulfur standard in R18-2-719.F refers to low sulfur fuel *oils*, therefore this standard is not applicable to natural gas combustion. R18-2-719.I and R18-2-719.J require recordkeeping and reporting requirements of fuel sulfur quantity. These requirements support the aforementioned sulfur standard, and as such are not applicable to natural gas combustion. The visible emissions standard, R18-2-719.E, imposes a 40% opacity limitation.

B. General Electric Gas Turbine and Solar Turbine

Because the General Electric turbine engine and the Solar turbine are subject to the provisions of 40 CFR 60, Subpart A and GG (NSPS), the pollutants that are controlled are SO₂ and NO_x.

SO₂: The emission limit for SO₂ requires EPNG to burn only pipeline quality natural gas that has a sulfur content of less than 0.8%.

NO_x: The maximum emission limit for NO_x is:

$$\text{STD} = 0.0150 \frac{(14.4)}{Y} + F$$

where: Y= heat rate

F = NO_x emission allowance

(Please see 60.332(a)(2) for a more

complete explanation of Y and F)

C. Non-point sources

The standards in Article 6 are applicable requirements for non-point sources. The following sources will be monitored:

1. Driveways, parking areas, vacant lots
2. Unused open areas
3. Open areas (Used, altered, repaired, etc.)
4. Construction of roadways
5. Material transportation
6. Material handling

7. Storage piles
8. Stacking and reclaiming machinery at storage piles

All of these areas must comply with the opacity limitation of 40%. The control measures for these sites include gravel for driveways(1) and native vegetation for unused open areas(2). Most of the other sources require control measures of dust suppressants and/or wetting agents(3-8). Material transportation and storage piles also include covering the material (5 and 7), while stacking and reclaiming includes minimizing fall distance (8).

EPNG has indicated in the application, that rare instances of open burning may occur. The condition in the permit directs EPNG to obtain a permit from ADEQ, or the local officer in charge of issuing burn permits.

C. Other Periodic Activities

Abrasive Blasting

EPNG has indicated in the permit application that there might be a few occasions on which abrasive blasting activities are conducted on-site. R18-2-726 and R18-2-702 (B) are applicable requirements, and as such have to be included in the permit.

Spray Painting

EPNG has indicated in the permit application that there might be a few occasions on which spray painting activities are conducted on-site. R18-2-727 and R18-2-702(B) are applicable requirements, and as such, have to be included in the permit. R18-2-727(A) and R18-2-727(B) are included in the approved State Implementation Plan (SIP). R18-2-727(C) and R18-2-727(D) are also a part of the approved SIP. They are present in the definitions section of the SIP as R9-3-101.117. EPA approved SIP provision R9-3-527.C is not present in the amended rule. However, R9-3-527.C is an applicable requirement, and is federally enforceable till the current State SIP is approved by the EPA.

Mobile Sources

EPNG has indicated in the permit application that there might be a few occasions on which “mobile source” activities are conducted. “Mobile sources” refer to those sources covered by Article 8. R18-2-801, R18-2-802, and R18-2-804 are applicable requirements, and as such, have to be included in the permit.

Monitoring and Recordkeeping Requirements

A. Clark Reciprocating Engines and Ingersoll Rand Reciprocating Engine

As noted in the preceding discussion under emission limits and standards, natural gas combustion results in minimal particulate matter emissions. It was therefore decided that even though an emissions standard exists for particulate matter, it would be unnecessary and impractical to have a rigorous monitoring schedule for the particulate standard. For similar reasons, it was decided that a monitoring schedule for opacity would not be required.

"Pipeline-quality" natural gas has to conform to standards approved by the Federal Energy Regulatory Commission (FERC). One of the FERC standards limits the sulfur content in the gas to less than 5 grains/100 scf (which is equivalent to 0.017 weight percent of sulfur). Another standard specifies that the heating value be greater than or equal to 967 Btu per cubic foot. EPNG runs the gas turbines with fuel drawn from their pipeline, and therefore it was decided that maintaining a copy of the FERC approved Tariff agreement on-site would be an adequate means of complying with the monitoring requirements for the particulate, opacity and fuel use standards.

The permit requires the permittee to report the dates of operation of the engines listed above on each date semi-annually, during the six months prior to the date of report.

B. GE Gas Turbine and Solar Turbine

SO₂: "Pipeline-quality" natural gas has to conform to standards approved by the Federal Energy Regulatory Commission (FERC). One of the FERC standards limits the sulfur content in the gas to less than 5 grains/100 scf (which is equivalent to 0.017 weight percent of sulfur). Another standard specifies that the heating value be greater than or equal to 967 Btu per cubic foot. EPNG runs the gas turbines with fuel drawn from their pipeline, and therefore it was decided that maintaining a copy of the FERC approved Tariff agreement on-site would be an adequate means of complying with the monitoring requirements for the sulfur standards.

Nox:

40 CFR 60.334(b) requires the Permittee of a stationary gas turbine to monitor the nitrogen fuel content of the fuel being fired in the turbine. However, the requirement to monitor the fuel nitrogen content has been waived as per EPA Memorandum *Authority for Approval of Custom Fuel Monitoring Schedules Under NSPS Subpart GG*, August 14, 1987. This memo was made available to our Division by Steve Frey of EPA Region IX. One of the items in the memo states:

"Monitoring of fuel nitrogen content shall not be required while natural gas is the only fuel fired in the gas turbine."

C. Non-point Sources

The specific non-point sources are listed in the above section. Monitoring and recordkeeping requirements for driveways (1) includes maintaining the gravel, and keeping a log of dates new

gravel is added. Unused open areas (2) includes a monthly status of the areas and dates fresh vegetation was added. All other non-point sources (3-8) require a record of the date and type of activity performed, and the type of controls used. Also, monitoring requirements for the applicable open burning rule may be satisfied by keeping all open burn permits on file.

D. Other Periodic Activities

Other applicable rules are abrasive blasting, spray painting and "mobile source" activities. It was decided to prescribe minimal monitoring requirements.

Reporting Requirements

The permit requires the permittee to report any change in the FERC approved tariff agreement relating to the sulfur content and the lower heating value of the fuel. The permittee is also required to submit, along with the semi-annual compliance certifications, the dates of operation of each reciprocating engine during the six months prior to the date of the report.

Testing Requirements

A. Clark Reciprocating Engines and Ingersoll Rand Reciprocating Engine

Although there are no emission limits or standards for NOx and CO, specifying a performance test schedule for either of these pollutants will help for the purpose of PSD review. For this reason, it was decided to include a clause in the testing requirements section for non-NSPS sources, which requires the source to conduct a performance test once for NOx and CO at least six months prior to permit expiration when the cumulative operation of all the engines exceeds fifteen days during the course of the permit.

B. GE Frame 5 Gas Turbine and Solar Turbine

EPNG is required to conduct an annual performance test prior to anniversary date for NOx on these NSPS engines. The source is required to conduct a performance test for CO once along with the first performance test for NOx on these NSPS turbines.

List of Special Provisions

In their application, EPNG provided a list of special provisions that they wanted to be addressed in the permit. This list is located in Tab 1 of the application. They have been addressed in the following manner:

Maintenance and Inspection (Item 1), Emergency Shut Down Systems (Item 3), Cathodic protection system (Item 4), General Maintenance & Construction Activities (Item 6), Start-up, Shutdown & Maintenance (Item 8), and Insignificant Activities (Item 9)

It was decided that each of these items qualified for classification as an insignificant activity, and as such was included in the list in Attachment "E".

Hazardous Air Pollutants (Item 2): Refer to Sections VI and X, Attachment "A".

Abrasive Blasting (Item 5): Abrasive blasting activities have an applicable requirement in the Arizona Administrative Code (AAC). Also, according to the definition in AAC R18-2-101.54, for an activity to be classified as insignificant, it should not have *any* applicable requirement. All projects have to comply with the requirements of R18-2-726 and R18-2-702(B). Refer to Attachment B, I.C.1 and II.C.1.

Spray Painting (Item 7): A similar argument as in Item 5 above provides the reason for including R18-2-726 as an applicable requirement. Refer to I.C.2 and II.C.2.

Emissions Trading (Item 10): ADEQ has determined that EPNG should apply for a permit revision (if necessary) in case there are any changes in the permitted equipment.

Location of records (Item 11): Refer Section II.B, Attachment "B".

Portable Sources (Item 12) : Any contractor operating portable sources on site will need to obtain an air quality permit (if required) to cover the portable source operation.

Air Conditioners (Item 13): Refer to Section XXI, Attachment "A".

Asbestos (Item 14): Refer to Sections I.C.4 and II.C.4, Attachment "B".

Performance Tests (Item 15): Refer to Section VI, Attachment "B".